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ABSTRACT

Nationwide data are provided on the 1987 salaries of members of each of the American Institute of Physics' 10 member societies. Of the approximately 13,600 society members who were mailed a questionnaire, 61% responded. Data are presented by: degree level, type of employer, gender, salaries for PhDs by geographic location, PhD salaries by employment sector and years from degree or academic rank, Masters-degree and Bachelors-degree salaries by employment sector, salaries by degree level and principal work activity, and PhD salaries by gender. The demographic and employment information concerning the 1,480 responding members of the American Geophysical Union, which became a member society in 1986, is presented in a special section, in order to make the main body of data consistent with previous years. (JDD)

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REPORT

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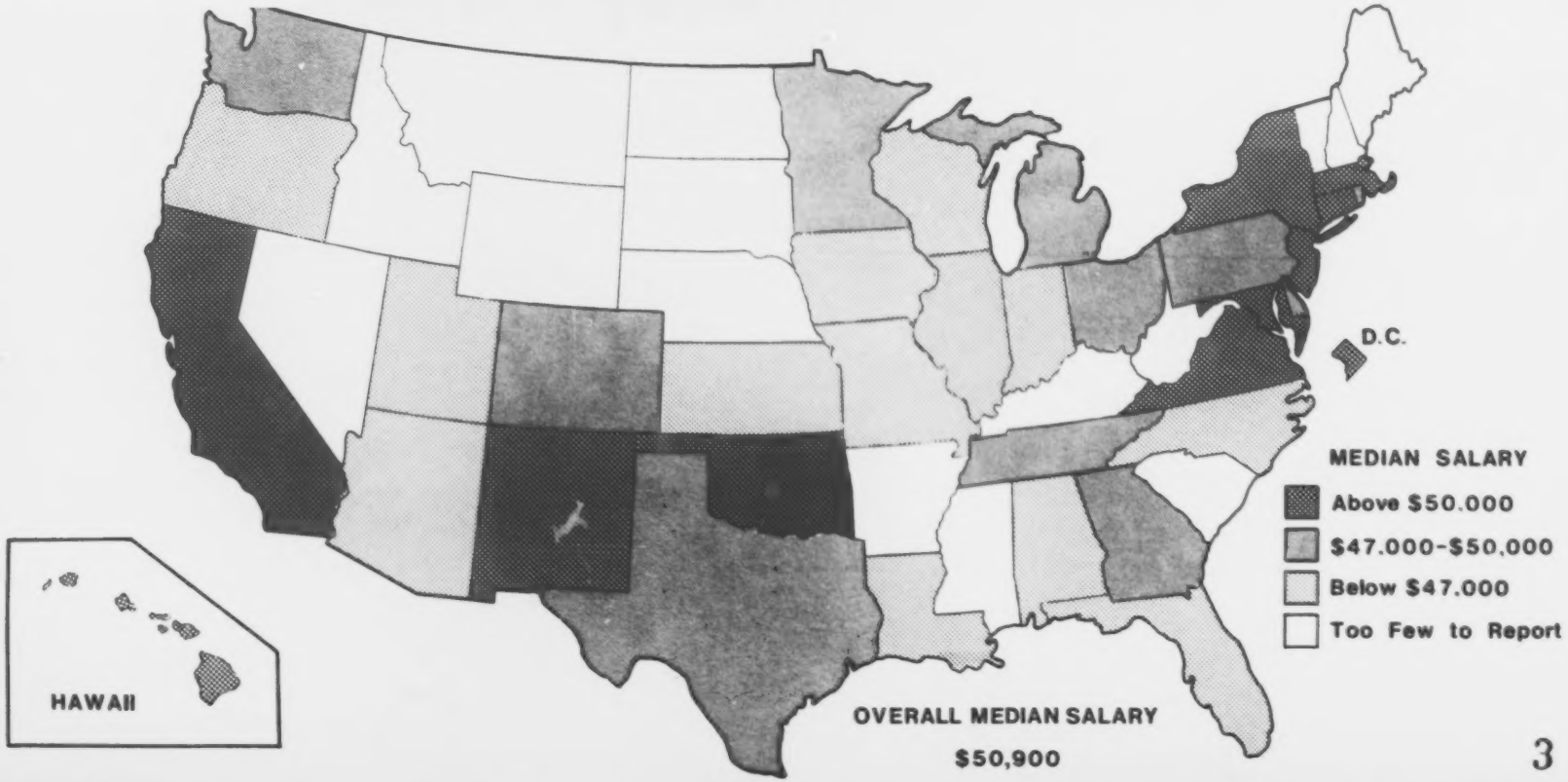
1987 SALARIES: SOCIETY MEMBERSHIP SURVEY



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1987 SALARIES:

SOCIETY MEMBERSHIP SURVEY

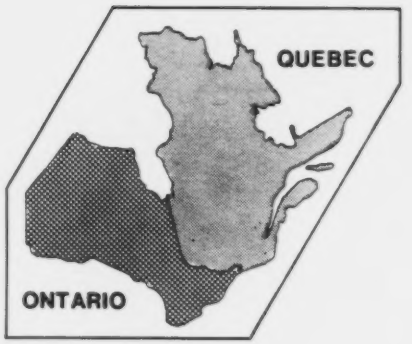
Dawn Kellman and W. Keith Skelton

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER (1)

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

Median salaries for PhD society members resident in the Canadian provinces of Quebec and Ontario in the accompanying figure are presented in Canadian dollars. The salaries in Quebec are somewhat lower than in Ontario, partly reflecting the heavier academic composition of the members residing there.



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INTRODUCTION

Background

"1987 Salaries: Society Membership Survey" is the fifth in a series of salary reports produced by the Education and Employment Statistics Division of AIP. Initiated in 1982, the series provides reliable nation-wide data on the salaries of members of AIP Member Societies. In addition to society members, this kind of information has found an audience among government officials, labor market analysts, and both employers and employees alike.

Methodology

The data presented here are based on a stratified random sample survey of one-sixth of the U.S. and Canadian membership of the AIP Member Societies. This sampling frame oversamples the smaller societies so that each of the ten AIP Member Societies is well represented. Each year the survey follows-up on previous respondents and expands to include a sample of new members. In this way, the survey maintains access to the changing trends associated with the growth of the Member Societies. Those eligible for inclusion in the 1987 sample had memberships which were current as of December 1986.

In the spring of 1987, every individual in our sample received a questionnaire in which they were asked to describe their employment in March of 1987. The brief, one-page form asked for such information as work activity, level of highest degree, salary, and type of employer. A postage-paid return envelope was provided. Several weeks after the initial mailing, a second wave of questionnaires were mailed to those sample members who had not yet returned a completed form. Of the approximately 13,600 society members who were mailed a questionnaire, 61% responded.

One unique aspect of the 1987 Salary Report involves the American Geophysical Union (AGU). AGU became an AIP Member Society in 1986, and their members were first queried for demographic and employment information as of March 1987. The addition of nearly 1,480 AGU respondents to the 1987 analysis increased the overall number of responding members by 20%. This publication is the Education and Employment Statistics Division's first examination of the AGU membership. Therefore, the report is divided into two segments. The main body of the material presented is consistent with previous years; members of AGU are not included in the summary statistics. In order to determine the impact of merging AGU member salaries with the salaries paid to those in the other nine societies, a special section of this report is devoted exclusively to the membership of AGU. Future salary reports will then examine the ten member societies as one unit.

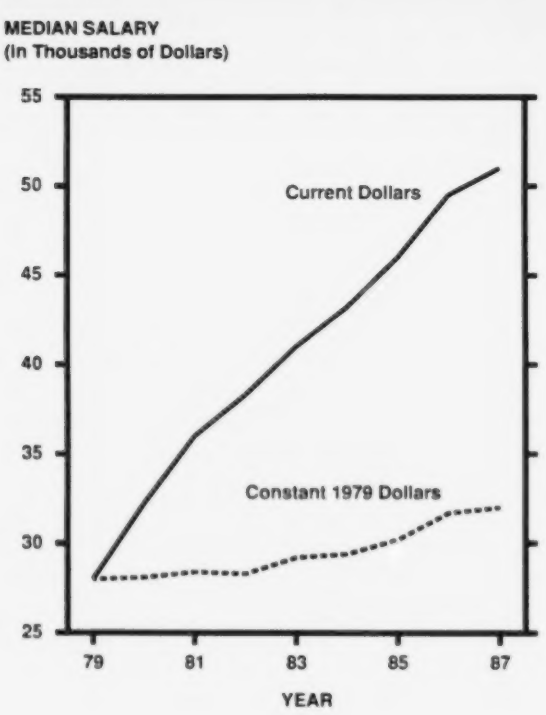

Figure 1. Median salaries for PhDs, 1979–1987. Both reported salaries and salaries adjusted for inflation are presented.

Table A. Professional self-identification, 1987.

	AGU %	Nine Societies %
Physicist	13	58
Astronomer	2	5
Engineer	12	16
Chemist	3	9
Geophysicist	33	–
Geologist[a]	13	–
Other Scientist	21	7
Other	3	5
Total Number Known	1615	6414
No Response	14	21

[a] The category Geologist was not explicitly included on the questionnaire until 1988. The percent listed for 1987 was calculated from those respondents who indicated "Other Scientist" on the questionnaire and wrote geologist on the comment form. It should thus be considered a lower limit.

Table B. Degree distribution, 1987.

	AGU %	Nine Societies %
Doctorate	61	68
Masters	27	21
Bachelors	12	10
Other	–	1
Total Number Known	1623	6406
No Response	6	28

Summary of Results

For the fifth year in a row, society members' salaries outpaced inflation. In March of 1987 the overall median salary of society members rose to $50,000, representing a 6.4% increase from the previous year. At the same time the inflation rate, hovering at the 3.0% mark, remained relatively stable. Consequently the purchasing power of society members remained strong.

Of course salary levels vary considerably across degree levels, employment sectors, geographic location and work activity. The figures, tables, and text that follow describe in some detail these variations. For those seeking additional data, the Education and Employment Statistics Division has statistical resources which may be of value. Please contact the division for more information.

Summary of Results, American Geophysics Union

The overall median salary of the AGU membership was $45,700 as of March 1987. This is a lower figure than that observed for the other nine societies combined. In order to better understand the salary variations observed between AGU members and the members of the other nine societies, a preliminary discussion of the composition of AGU is presented here. More in-depth analyses of AGU's demographic and employment characteristics will be presented in the next Society Membership Profile.

In general, AGU members are younger than those in the other AIP Member Societies. This alone accounts for much of the salary differential. In comparison to the other nine societies, AGU also has a slightly higher representation of bachelors and masters degree recipients, a lower proportion of industrially employed members, and a larger representation of women. Each of these factors has an effect on salary levels. Tables A through D broadly describe AGU members, who they are and where they are employed.

Caveats

While the majority of this report describes the various salary levels found in March 1987, salary changes between 1986 and 1987 are mentioned. Comparisons for this one year period cross-sectional, e.g., the 1986 median salary of industrially employed PhDs are compared with the median salary of industrially employed PhDs in 1987. From the point of view of employers, this kind of comparison reflects the "going rate" for such personnel, but caution must be exercised. Cross-sectional analyses reflect net salary changes and are sensitive to any movement into or out of that particular subgroup, such as an influx of young employees, or retire-

Table C. Type of employer, 1987.

	AGU %	Nine Societies %
University	40	36
4-Year College	2	4
Junior College	–	2
High School	–	5
Industry/Self-Employed	22	31
Government	24	9
National Laboratory	7	9
Non-Profit/Hospital	5	4
Total Number Known	1479	5739
No Response	12	92

Table D. Miscellaneous demographics, 1987.

	AGU	Nine Societies
Median Age	40	45
% Full-Time Employed	80.3	81.9
% with U.S. Citizenship	86.7	87.3
% Women	13.5	8.5
% Students	14.8	9.2

ments. For employers and society members seeking data on typical salary increases, longitudinal data are presented for the period between 1985 and 1987. Longitudinal data, which look at the same people at two or more points in time, provide a better picture of actual salary increases.

Most of the discussion in this document centers on median and quartile salaries, which are the preferred descriptive measures of central tendency and variation in typically skewed salary distributions. The tables also present salary means and standard deviations, as well as median ages, which are useful for comparative analyses. Please consult Appendix B for definitions and technical notes on the measures used in this report.

One final note: salary tables discussing lower-degree holders must be interpreted with caution. Lower degree holders are poorly represented in the membership and those who are members tend to be atypical, with a special interest in specific society programs. In fact, the majority of masters and bachelors degree holders in the membership are advanced graduate students who are not included in these salary analyses.

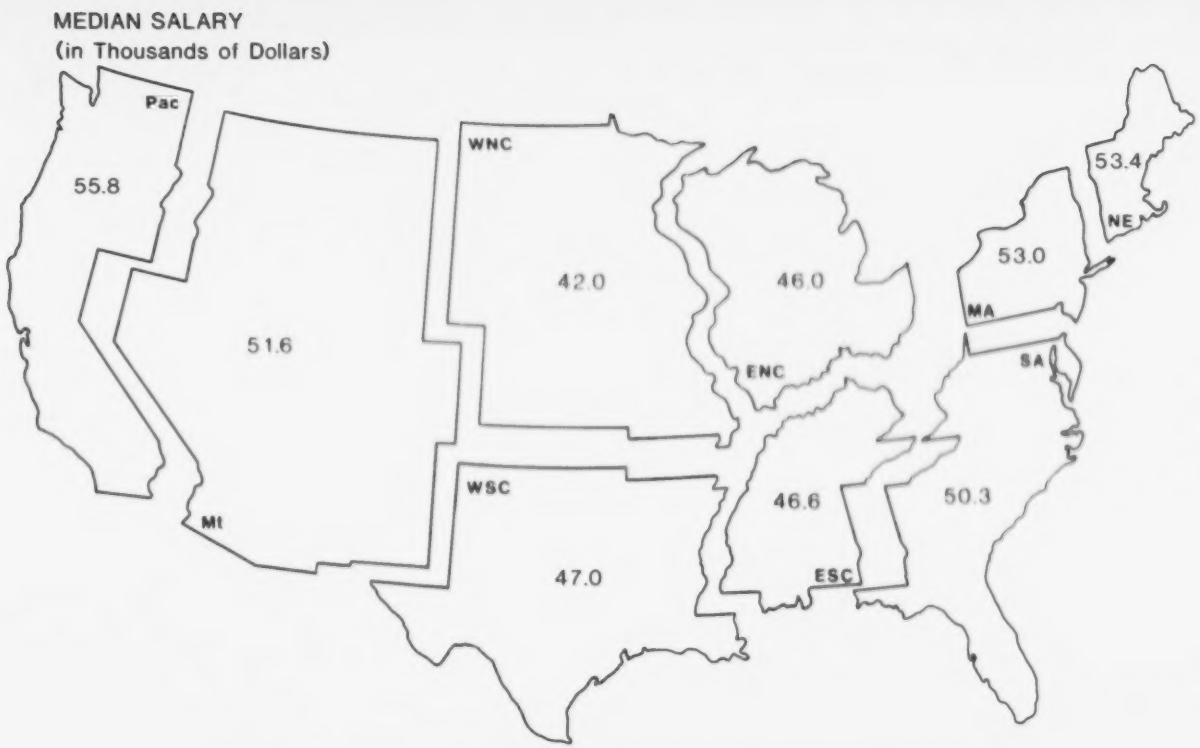

Figure 2. Variation in median salary for PhDs by geographic division, 1987.

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• The three main factors that dictate the salary levels found throughout the United States are (1) the distribution of employment sectors within each geographic location, (2) the salary structure of different employment sectors, and (3) the interdivisional age variations.

• From one part of the country to the next, median salaries for industrially employed members are consistently higher than those in other employment sectors. Salary differences between academically employed society members and those working in industry represent the greatest disparity, with salary differences ranging from $11,700 in the East North Central to $18,000 in the Mountain and New England States. In addition, academically employed members are, on average, four years older than those in industry. The distribution of states within each division can be found in Appendix A.

• Though the median industrial salary in the Pacific division falls in line with the national average for that employment sector, salaries within academe and the national laboratories are the highest in the country. Consequently, society members employed on the Pacific coast maintain the highest overall median salary of $55,800. One should note that 93% of the membership who live in the Pacific Division reside in California. The large number of members in California therefore overshadows the influence that Washington, Oregon, Hawaii, and Alaska have on divisional statistics.

Table 1. 1987 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	53.4	54.8	19.8	44	338
Middle Atlantic	53.0	55.5	21.6	45	724
South Atlantic	50.3	52.6	18.5	45	625
East North Central	46.0	48.6	17.4	45	450
East South Central	46.6	46.4	12.9	46	133
West North Central	42.0	45.6	21.3	45	135
West South Central	47.0	50.1	18.0	45	202
Mountain	51.6	53.0	17.0	45	329
Pacific	55.8	58.1	20.4	44	713
Canada[b]	53.0	54.7	15.8	46	133

[a] See Appendix A for state composition of each division.
[b] Canadian salaries are reported in U.S. dollars. One U.S. dollar = 1.33 Canadian dollars.

Table 2. 1987 salaries by selected employment sector and geographic division, PhDs.

	Academic			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	45.0	45	54	63.0	44	29	55.0	45	17
Middle Atlantic	45.0	47	45	60.0	41	44	54.0	46	11
South Atlantic	43.6	46	41	58.0	44	16	55.0	46	43
East North Central	42.3	46	65	54.0	41	19	52.0	46	16
East South Central	39.0	48	50	*	*	*	51.8	46	43
West North Central	37.4	46	68	54.5	39	24	*	*	*
West South Central	41.3	47	61	58.5	42	31	*	*	*
Mountain	42.0	47	36	60.0	43	14	56.6	44	50
Pacific	48.0	46	34	60.0	43	39	56.9	44	27
Overall	43.0	46	47	59.5	42	28	55.0	45	25

**Number of respondents was too small to calculate reliable medians.*

Table 3. 1985 and 1987 salaries by geographic division, PhDs.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age In 1987	Total Number Known
		(in thousands of dollars)				
New England	1985	48.0	50.0	17.8		
	1987	55.0	56.7	18.1	46	236
Middle Atlantic	1985	48.0	50.5	20.3		
	1987	55.0	57.3	21.1	46	516
South Atlantic	1985	47.6	48.3	15.6		
	1987	54.0	54.8	16.9	47	458
East North Central	1985	42.0	43.7	15.2		
	1987	49.0	50.4	16.8	47	322
East South Central	1985	41.0	40.9	11.0		
	1987	48.0	47.8	12.3	48	96
West North Central	1985	39.0	40.5	13.6		
	1987	43.7	46.1	15.8	46	105
West South Central	1985	44.4	46.7	16.7		
	1987	49.4	51.9	18.1	47	149
Mountain	1985	47.6	48.7	15.8		
	1987	54.3	55.2	16.3	46	252
Pacific	1985	50.0	52.1	17.2		
	1987	57.0	59.9	19.3	45	496

• The overall PhD salary observed in the West North Central is the lowest in the United States, $4,600 below the next lowest division. This is primarily a result of the large proportion of academically employed society members earning the lowest PhD salaries in the nation. The vast majority of these members are working at state colleges and universities or small private colleges, institutions where academic salaries tend to be lower than those earned at large private universities.

• Between 1985 and 1987, PhDs living in the West South Central received the smallest divisional salary increases in the nation, roughly five and one-half percent annually. Suppressed salaries in this area are due, in large part, to the struggling oil industry in Texas, Oklahoma, and Louisiana.

• Industrially employed society members residing in New England command the highest salaries in the nation, $63,000 annually. While their colleagues in the Middle Atlantic states earn $60,000 it is important to note the age variations between these two divisions. New England society members are, as a group, three years older than those living in the Middle Atlantic, making the salary difference between these two groups negligible.

Table 4. 1987 salaries and employment sector distribution for selected states and Canadian provinces, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known	Academic %	Industry %	Gov't %	FFR&DC %	Other %
Alabama	42.6	44.5	11.9	43	28	61	10	29	–	–
Arizona	46.5	50.6	18.1	46	47	59	21	4	11	5
California	56.5	59.2	20.1	44	641	30	40	4	21	5
Northern	57.1	59.7	20.5	44	315	27	36	3	27	7
Southern	56.0	58.7	19.8	44	326	34	45	3	15	3
Colorado	49.5	51.5	18.6	46	83	52	22	21	5	–
Connecticut	53.0	55.4	21.7	44	71	54	33	9	–	4
Delaware	49.0	48.7	13.2	43	28	31	59	–	–	10
DC	57.9	57.2	15.3	48	147	5	3	86	–	6
Florida	46.0	48.4	18.0	47	54	73	11	11	–	5
Georgia	49.0	49.7	17.9	44	44	83	15	–	–	2
Illinois	46.0	48.7	18.2	45	147	55	14	–	28	3
Indiana	48.5	48.9	14.2	48	49	84	11	–	–	5
Iowa	38.0	43.3	18.1	46	26	90	–	–	4	6
Kansas	33.0	37.6	11.7	46	21	95	5	–	–	–
Louisiana	40.6	43.3	14.1	47	21	81	10	2	–	7
Maryland	52.0	52.9	16.7	44	156	32	20	41	4	3
Massachusetts	54.8	55.6	19.4	43	234	51	29	11	6	3
Michigan	45.0	49.3	19.9	45	84	65	30	–	–	5
Minnesota	48.7	55.0	29.2	41	41	36	59	–	–	5
Missouri	45.0	45.5	17.2	46	27	69	22	–	–	9
New Jersey	56.6	60.0	19.6	41	218	18	72	2	6	2
New Mexico	56.5	57.8	15.2	43	148	10	7	6	75	2
New York	52.0	55.3	23.0	46	352	53	34	–	7	6
Northern	50.0	53.6	21.7	45	178	61	35	1	1	2
Southern	54.2	57.1	24.2	46	174	45	33	–	13	9
North Carolina	46.2	49.0	22.4	48	50	87	7	–	–	6
Ohio	50.0	49.1	15.9	46	118	62	21	8	3	6
Oklahoma	46.8	49.0	14.6	48	21	53	40	5	–	2
Pennsylvania	49.4	49.6	19.2	46	154	64	28	4	–	4
Tennessee	48.5	48.6	13.3	46	83	38	7	–	54	1
Texas	50.0	51.9	18.9	44	149	58	35	1	–	6
Utah	44.0	43.9	14.7	45	23	82	16	–	–	2
Virginia	51.0	56.4	22.4	45	107	43	27	20	7	3
Washington	48.0	51.5	20.3	45	39	55	40	–	5	–
Wisconsin	42.0	45.4	17.5	44	51	80	17	–	–	3
Ontario	57.6	56.1	15.0	45	57	57	12	25	3	3
Quebec	48.0	52.7	17.2	43	25	88	12	–	–	–

[a] Several states were not included above because the number of respondents was too small to calculate reliable statistics.

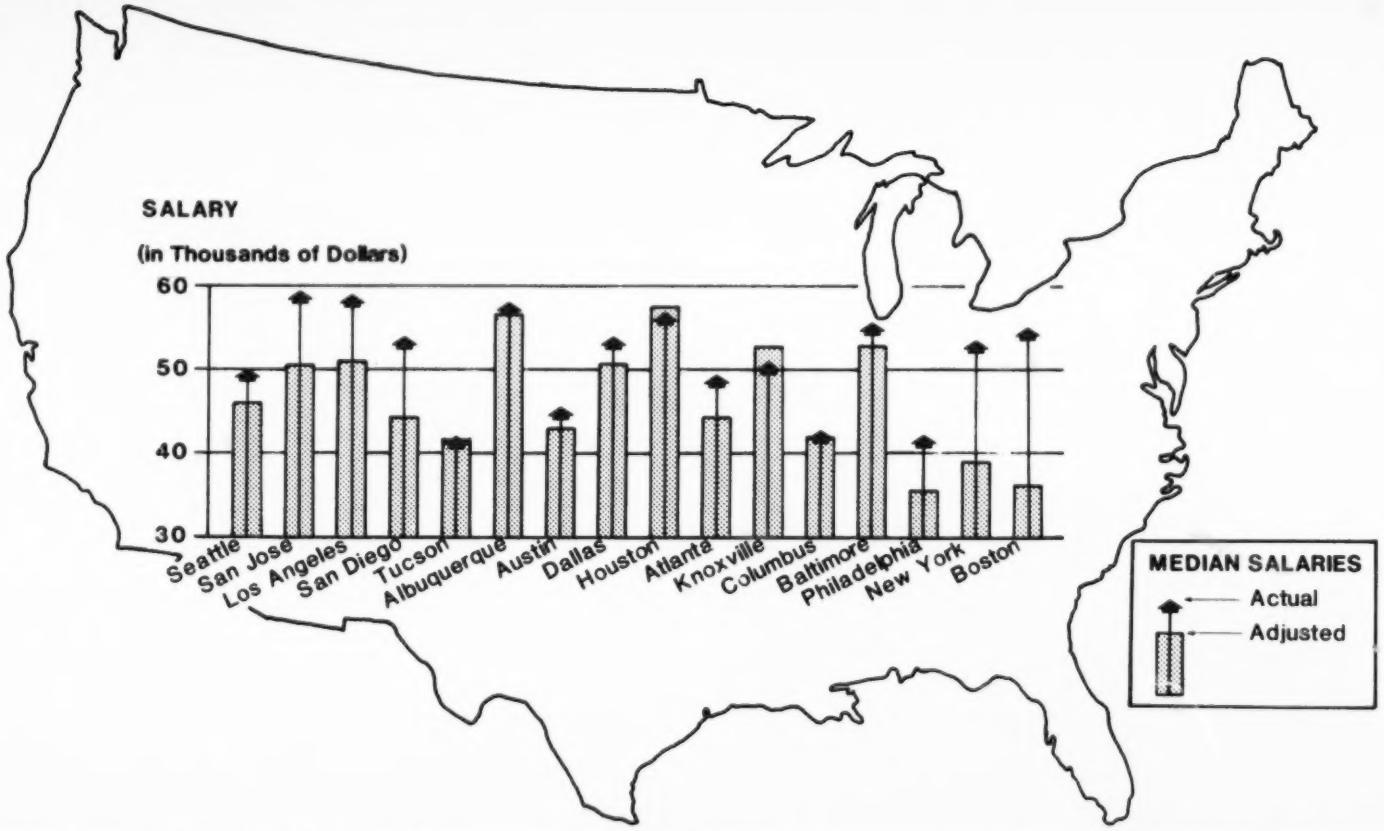

Figure 3. Median salaries for PhDs in 16 metropolitan areas, 1987. Both actual salaries and salaries adjusted for cost of living are represented.

• The cities listed in Table 5 all volunteered to participate in a survey developed by the American Chamber of Commerce Researchers Association (ACCRA). The questionnaire was developed to "provide a useful and reasonably accurate measurement of inter-city cost of living differences." The cost of living index represents a market basket of goods and services for the first quarter of 1987. Certain large cities (such as Chicago, Washington, D.C., and San Francisco), are notably absent from the list due to a lack of response to the ACCRA survey.

• There is a direct relationship between the size of a metropolitan area and the cost of living. In general, society members reside in larger, more expensive, urban centers where employment opportunities are more likely to be found for physicists with advanced training. As a consequence, only two cities listed in Table 5, Houston and Knoxville, have a lower cost of living index than the national average (100).

• Society members at petroleum-related corporations in Houston and other cities in the Southwest have been hit hard by the drop in crude oil

Table 5. 1987 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	102.8	58.2	56.6	43	12	88	60
Atlanta	111.9	49.5	44.2	44	80	20	37
Austin	105.7	45.5	43.0	44	82	18	27
Baltimore	105.2	55.5	52.8	45	44	56	37
Boston	152.2	55.0	36.1	43	53	47	140
Columbus, Oh	102.2	42.8	41.9	47	81	19	36
Dallas	106.6	54.0	50.7	42	16	84	26
Houston	99.1	57.0	57.5	46	54	46	39
Knoxville	96.8	51.0	52.7	46	16	84	57
Los Angeles	115.7	59.0	51.0	45	35	65	115
New York	137.2	53.4	38.9	46	50	50	117
Philadelphia	118.7	42.0	35.4	44	62	38	43
San Diego	121.8	54.0	44.3	45	28	72	53
San Jose	117.8	59.5	50.5	40	23	77	38
Seattle	108.5	49.9	46.0	45	61	39	23
Tucson	100.9	42.0	41.6	44	65	35	25

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0*

$$\text{Adjusted salary} = \frac{\text{Median Salary}}{\text{cost of living \%}}$$

prices. By the end of 1986 the price of crude oil had declined by more than half from its peak 1981 dollar value. Over the same period, the cost of living in Houston dropped substantially, reflecting this slump in the oil industry. One index of the downturn taking place in Houston, related to the society membership, is the rapidly increasing age structure of those members residing there. While the median age for all PhD society members increased from 44 to 45 during the period between 1983 and 1987, in Houston it skyrocketed from 38 to 46. This reflects the flight of younger employees after layoffs, as well as the lack of opportunities for new entrants into the economy. Those with more seniority who were able to hold on to their positions fared well; they earned an adjusted median salary of $57,500, the highest of any city listed in Table 5.

• Society members living in New York City and Boston must endure some of the highest rents, utility costs, and health care expenses in the country. All of these factors place these two northeastern cities at the top of ACCRA's cost of living index. Upon adjusting for cost of living, salaries for members living in New York and Boston are below the national median by $12,500 and $15,300, respectively. While New York's adjusted salary appears to have a slight edge on Boston's, ACCRA's index does not take into account local taxes. Members living in New York who earn over $50,000 pay nearly twice as much local tax as Boston residents. (U.S. News and World Report: Jan 9, 1989)

• Knoxville and Albuquerque are two of the cities listed in Table 5, besides Houston and Baltimore, that maintain adjusted salaries above the national median of $51,400. Many society members living in or around these cities are employed at one of two national laboratories: Oak Ridge outside of Knoxville and Sandia located in Albuquerque. In 1987, the median salary for PhDs employed at national laboratories was $56,400, $5,000 over the national median and second only to industry.

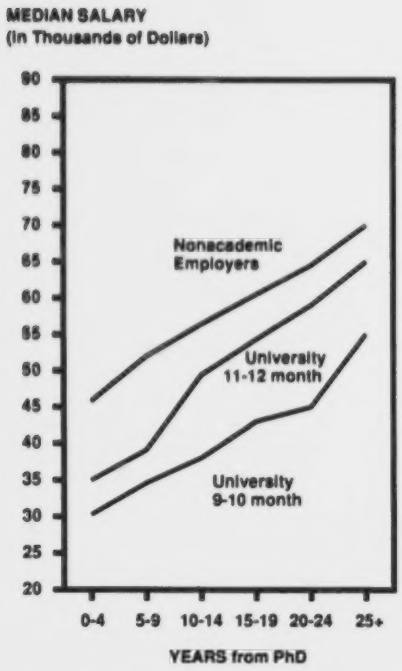

Figure 4. Median salaries by type of employer and years from PhD, 1987.

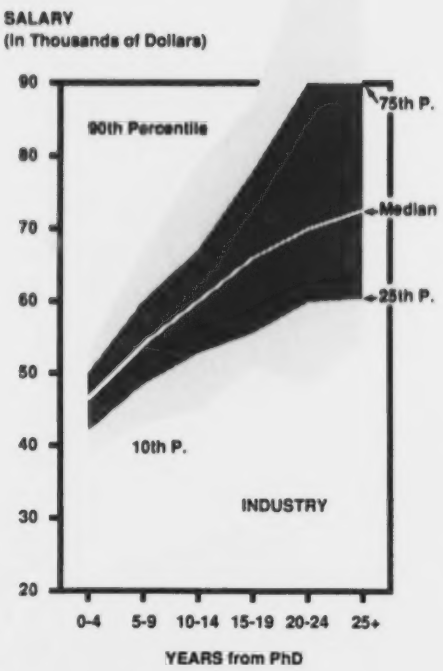

Figure 5. Salary structure in industry by years from PhD, 1987.

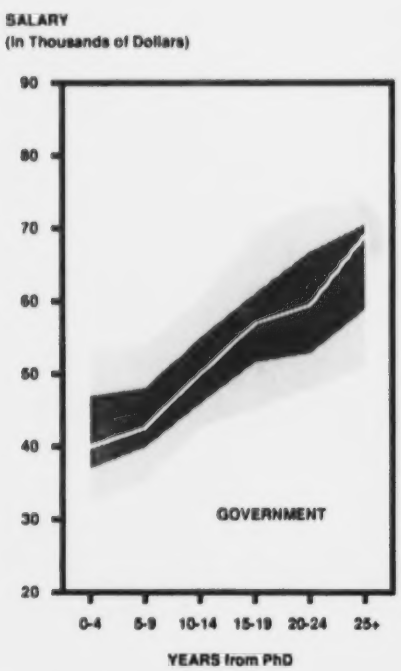

Figure 6. Salary structure in government by years from PhD, 1987.

SALARIES AND EMPLOYMENT SECTOR FOR PhDs

• In 1987 the median salary for PhDs rose to $51,000. Of course salary levels vary widely across employment sectors. For example, a scientist working at a four-year college will, on average, earn considerably less than a colleague with the same amount of experience working in government. The variation in salary levels between sectors begins at the lowest levels of experience and becomes more marked as the professional career progresses.

• A recent doctorate entering the labor force can expect to command the highest starting salary by entering the private sector. In 1987 the median starting salary in industry reached $46,400. By comparison, those starting their careers in national laboratories received a somewhat lower median starting salary of $45,000, those in government $40,000.

• At all levels of experience, industrially employed PhDs receive the highest salaries. The best paid industrial PhDs with the highest level of experience commanded salaries in excess of $105,000 in 1987. Among these top wage earners are some self-employed members.

• Across all employment sectors, salaries climb with professional experience. Yet each sector has its own unique salary distribution. In industry, salaries are clustered within a narrow range at entry-level but broaden considerably with experience.

Table 6. 1987 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
University					
9–10 Month Salary	43.3	46.4	14.2	49	814
11–12 Month Salary	48.0	49.8	21.4	43	575
4-Year Colleges					
9–10 Month Salary	33.3	35.2	8.9	47	142
Industry/Self-Employed	59.5	63.0	21.4	42	1014
Government	54.0	54.4	12.1	47	348
FFR&DC	56.4	57.6	15.3	44	430
Nonprofit	50.5	52.1	20.5	44	91
Hospital	55.0	58.6	21.4	45	52

Table 7. 1987 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	36.0	36.3	11.7	32	511
5–9	46.0	46.1	14.6	36	591
10–14	52.0	52.8	16.5	41	553
15–19	55.0	56.6	17.9	45	703
20–24	56.1	59.0	20.9	50	547
25–29	60.5	62.9	18.0	56	337
30 +	63.4	65.9	21.4	62	385

Table 8. 1987 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	39.0	42.0	46.4	50.0	53.0	46.5	8.8	32	146
5–9	43.0	48.5	54.0	60.0	67.0	55.8	14.9	36	210
10–14	45.0	52.9	60.0	67.0	79.1	62.0	15.9	41	180
15–19	51.0	55.7	66.0	77.9	87.5	67.8	17.1	45	191
20–24	48.2	60.0	70.0	90.0	110.0	76.9	29.8	50	113
25 +	54.0	60.5	72.6	90.0	106.0	77.6	23.6	59	146

[a] In addition, there were 17 postdoctorates with a median salary of $36,000.

Table 9. 1987 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	32.2	37.0	40.0	47.0	53.2	42.0	9.9	31	24
5–9	35.0	40.0	42.6	48.0	54.0	44.0	7.4	36	45
10–14	42.6	46.0	50.0	54.9	60.3	50.7	7.3	42	66
15–19	45.2	51.8	57.0	61.0	69.5	56.9	8.9	46	70
20–24	48.0	53.0	59.5	66.7	73.4	60.1	9.6	50	61
25 +	51.0	59.0	69.0	70.5	73.2	64.5	9.2	59	71

[a] In addition, there were 7 postdoctorates with a median salary of $28,000.

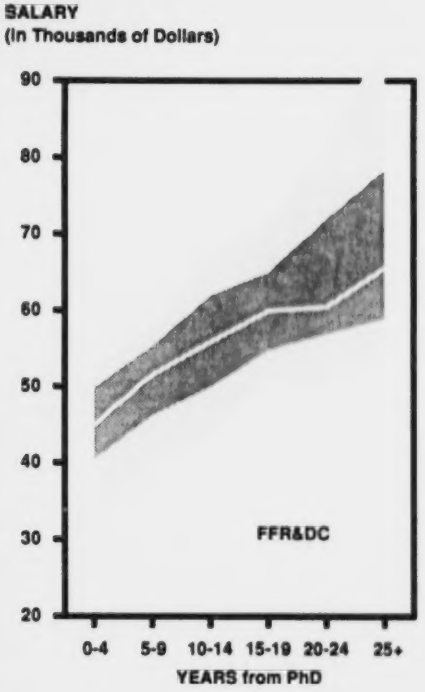

Figure 7. Salary structure in the national laboratories by years from PhD, 1987.

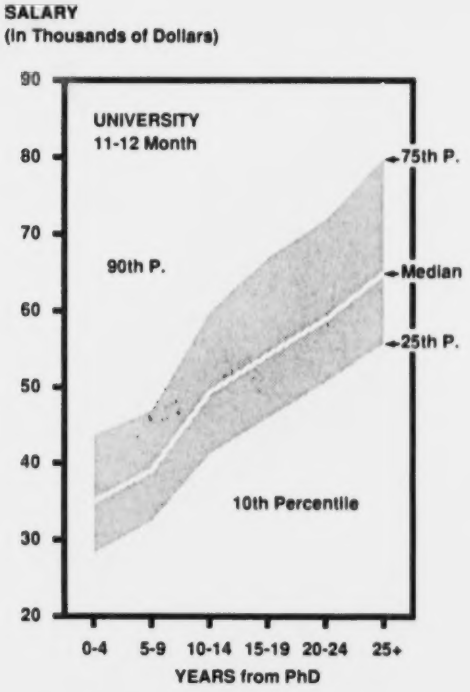

Figure 8. Salary structure in universities for 11–12 month salary base, by years from PhD, 1987.

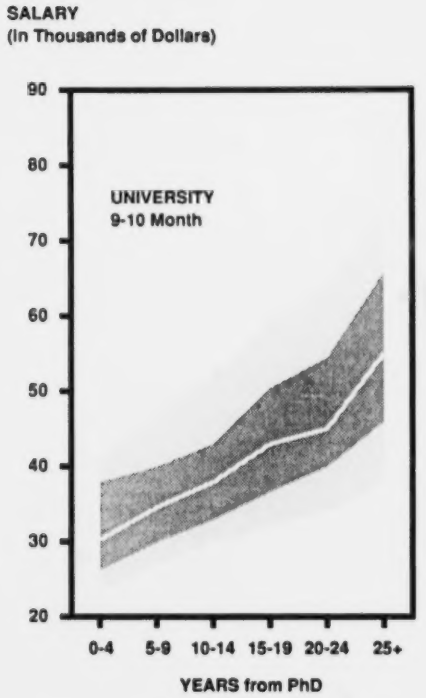

Figure 9. Salary structure in universities for 9–10 month salary base, by years from PhD, 1987.

• Government salaries are dictated, to a large extent, by the structure of the civil service grades. According to the Office of Personnel Management, government employees across all degree levels who worked in physics in 1987 were, on the average, in General Schedule Grade 13. Except at the highest level of experience, government workers are still paid well below industry rates and there is increasing pressure within the public sector to be more competitive with industry. The Advisory Committee on Federal Pay estimates that an increase of between 21.6% and 28.8%, depending on grade level, would be required to obtain comparability with the private sector.

• In the past, government employees have typically received "comparability" increases. These are percentage increases given to federal employees to narrow the gap between government and private sector salaries. In 1987 the President's alternative pay plan provided a 2.0% increase. Congress overrode it by passing a 3.0% increase. This small increase is directly reflected in the 4.9% change observed for members working in the public sector.

• Salary ranges for those working on a 9–10 month salary base in universities are relatively narrow at each level of experience. More variability is observed in the university 11–12 month salaries, reflecting the wide range of academic positions including tenured and non-tenured staff, administrative personnel and professors receiving federal grants.

Table 10. 1987 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	32.0	40.5	45.0	49.9	53.1	44.5	7.6	32	42
5–9	39.5	46.3	51.6	55.4	58.0	50.4	8.4	35	74
10–14	43.8	50.0	55.9	62.0	68.0	56.1	10.5	40	69
15–19	51.0	54.9	60.0	65.0	72.0	60.9	9.0	45	89
20–24	50.0	57.0	60.5	72.0	82.7	64.2	11.5	49	58
25 +	54.0	59.0	65.6	78.4	95.0	70.7	18.5	59	79

[a] *In addition, there were 17 postdoctorates with a median salary of $28,900.*

Table 11. 1987 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	25.0	28.3	35.0	43.7	48.0	36.5	10.1	32	36
5–9	28.5	32.5	39.1	47.0	58.8	41.7	12.9	36	82
10–14	36.1	41.3	49.4	60.0	80.5	52.6	15.9	40	69
15–19	38.4	46.0	54.3	67.0	80.0	58.2	20.2	45	104
20–24	42.0	50.8	59.0	72.0	84.0	61.6	16.1	50	81
25 +	48.3	55.9	65.0	80.0	90.0	68.3	18.2	59	97

[a] *In addition, there were 79 postdocs in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $24,000.*

Table 12. 1987 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES (in thousands of dollars) 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	23.5	26.3	30.3	38.0	41.0	31.9	6.9	33	48
5–9	27.0	30.0	34.6	40.0	47.8	35.4	7.8	36	100
10–14	30.0	33.0	38.0	43.0	52.0	40.0	10.3	41	83
15–19	31.9	36.7	43.0	50.4	60.0	44.4	10.7	45	142
20–24	34.0	40.0	45.0	54.4	65.0	47.6	11.8	50	175
25 +	38.0	46.0	55.0	65.9	74.5	55.8	14.5	59	261

[a] *Postdocs excluded.*

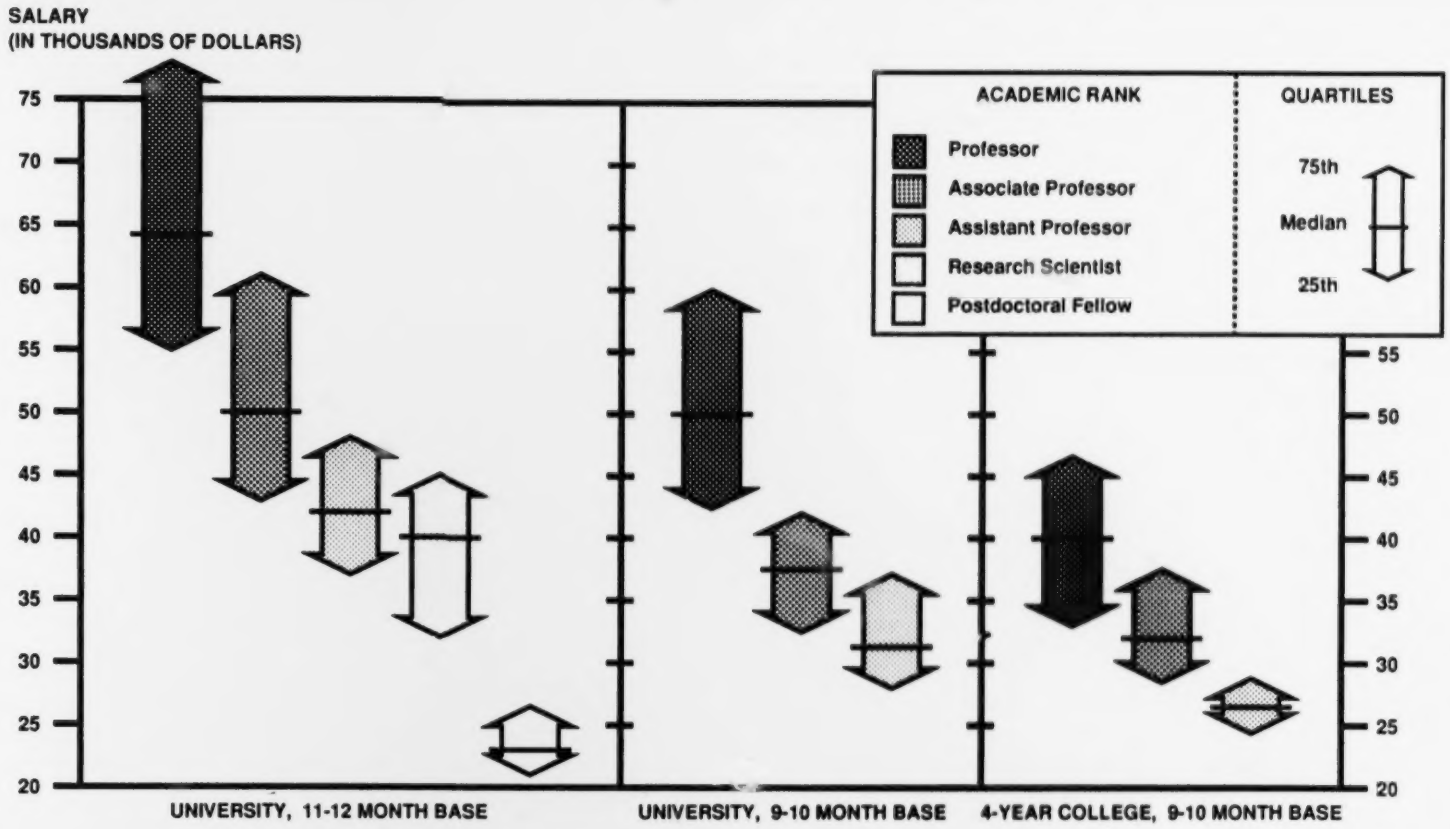

Figure 10. University and 4-year college salaries for PhDs by academic rank, 1987.

Salaries and Academic Rank

• Academe employs nearly half of all society members with PhDs. In general, the bulk of the academically employed work in universities, are somewhat older than their non-academic peers, and earn salaries at a rate below those outside academe.

• The physics community as a whole is aging. Due to the sharp drop in PhD production in the 1970's, the median age of physicists across all employment sectors has been steadily increasing. In academe, however, the situation is especially dramatic; the percentage of assistant professors among the faculty has steadily declined over the past ten years. Consequently, the median age of the professoriate has risen past 50. As the bulk of the university faculty reach retirement age in the coming decade, the tight academic labor market of the 1980's may give way to abundant professional opportunities for those seeking academic careers.

Table 13. 1987 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)						
Professor							
9–10 month salary	42.4	50.0	60.0	52.1	13.3	53	519
11–12 month salary	55.0	64.2	78.0	66.6	17.3	51	202
Associate Professor							
9–10 month salary	32.5	37.5	42.0	38.5	7.7	44	163
11–12 month salary	42.9	50.0	61.0	55.5	19.2	43	72
Assistant Professor							
9–10 month salary	28.0	31.3	37.1	32.5	5.9	34	113
11–12 month salary	37.0	42.0	48.0	43.4	11.2	35	56
Research Associate (11–12 month salary)							
Postdoctorates	21.0	24.0	26.5	23.7	4.2	31	89
Other Research Staff	32.0	40.0	45.0	40.6	11.2	40	65

Table 14. 1987 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	25th	QUARTILE SALARIES Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)					
Professor	33.0	40.0	46.6	39.8	9.1	50	67
Associate Professor	28.5	32.0	37.5	32.8	6.4	46	49
Assistant Professor	24.4	26.5	28.8	27.5	4.3	35	25

• University full professors employed on an 11–12 month salary base earned, on average, between $55,000 and $78,000 in 1987. The broad range reflects the variety of activities available to university professors, including administration and grant-funded research. Among the top wage earners in this category are professors holding appointments with university-affiliated hospitals and those teaching in medical schools.

• After two years of steadily increasing salaries, the average salary paid to postdoctoral fellows appears to have stabilized. In 1987 the typical postdoctoral holder was paid $24,000. The smaller numbers of postdoctorates outside of academe tend to earn somewhat more.

• A new academic track has gained prominence during the past decade: the research scientist. Close in age to associate professors, research scientists earn salaries comparable to assistant professors, but in general have no tenure and fewer teaching responsibilities. In many cases these are "soft money" positions, that is, positions which are dependent upon grants and other research funding for their renewal.

• Median salary levels in 4-year colleges ranged by rank from $26,500 to $40,000 in 1987. This is roughly 15–25% lower at each professorial rank than salaries earned by those employed in universities on a 9–10 month salary base.

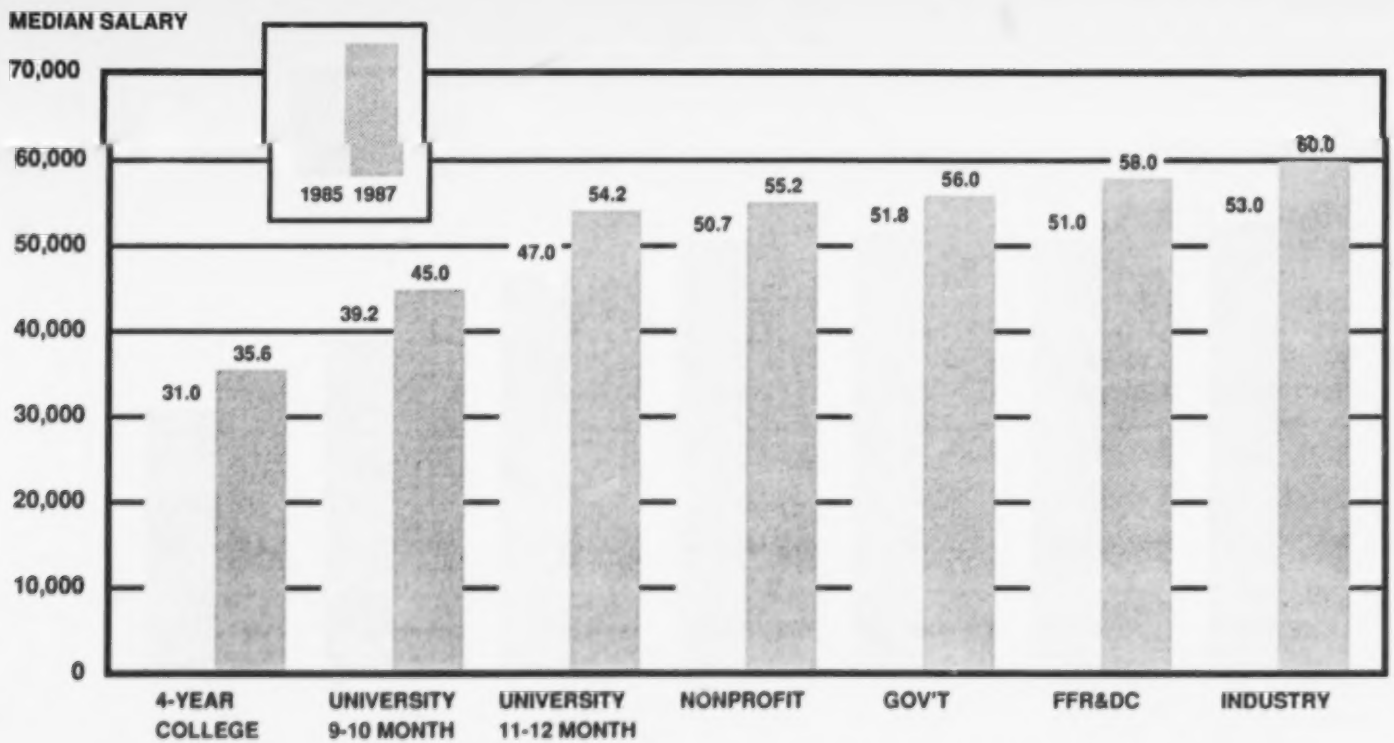

Figure 11. 1985 and 1987 median salaries by employment sector for PhDs remaining with the same employer.

Salary Increases and Employment Sector, 1985–1987

- The most reliable indicators of salary increases are longitudinal data, that is, information collected on the same individual at two points in time. During the period from 1985 to 1987, typical two-year salary increases given to PhDs who remained with the same employer ranged from 8 to 15% in the various employment sectors. This compared favorably to the two-year inflation rate of 5.4%. It is possible, however, that with the low level of inflation since 1985, about 3% a year, the size of salary increments reported in the future may adjust downward in many employment sectors.

- The highest percentage salary raises were reported by members working in academe. University employees remaining with the same institution between 1985 and 1987 received, on average, salary raises of 15%. Those employed in 4-year colleges also earned increases in the 15% range. By comparison, members employed in industry or at national labs earned somewhat smaller increases of 13 and 14% respectively, but higher absolute dollar amounts.

- PhDs employed in government earned the lowest salary increases, approximately 8% overall, or 4% annually. This was due, in large part, to federal budgetary constraints which limited not only the size of salary raises but the government salary ceiling as well.

Table 15. 1985 and 1987 salaries for members continuing with the same employer within selected employment sectors, PhDs.

	Year	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age in 1987	Total Number Known
University						
9–10 month salary	1985	39.2	41.6	12.9		
	1987	45.0	47.6	14.3	50	570
11–12 month salary	1985	47.0	48.2	16.1		
	1987	54.2	55.9	18.9	46	344
4-Year College						
9–10 month salary	1985	31.0	31.9	7.9		
	1987	35.6	36.3	8.7	47	105
Industry	1985	53.0	57.9	20.2		
	1987	60.0	65.2	20.5	44	584
Government	1985	51.8	52.0	10.6		
	1987	56.0	56.6	10.5	48	266
FFR&DC	1985	51.0	52.4	12.2		
	1987	58.0	59.6	13.4	45	306
Hospital & Nonprofit	1985	50.7	53.1	16.5		
	1987	55.2	60.8	20.0	46	85

[a] Data based on society members who responded in both 1985 and 1987, were full-time employed, and did not change employers in the years 1985–87.

Salary Increases Within Universities, 1985–1987

- Although members employed by universities earn considerably lower salaries than their peers in the private sector, the past several years have brought steadily increasing academic salaries. Society members who were employed in universities as full or associate professors (and did not change their rank during the two years from 1985 to 1987) received salary increases in the 13–19% range.

- Society members in the entry level ranks fared even better over the same two-year period. PhDs holding assistant professorships on an 11–12 month salary base received increases of 21% or more between 1985 and 1987.

Salary Increases and Employer Changes, 1985–1987

- The magnitude of the salary increases for PhDs who changed employers between 1985 and 1987 reflects two phenomena: the individual's relative position within the salary structure of the 1985 employer, and the overall differences in salary levels paid by the major employment sectors. In general, younger members tend to receive larger increases; salaries tend to rise rapidly during the first several years of a career and then gradually level off in the years beyond.

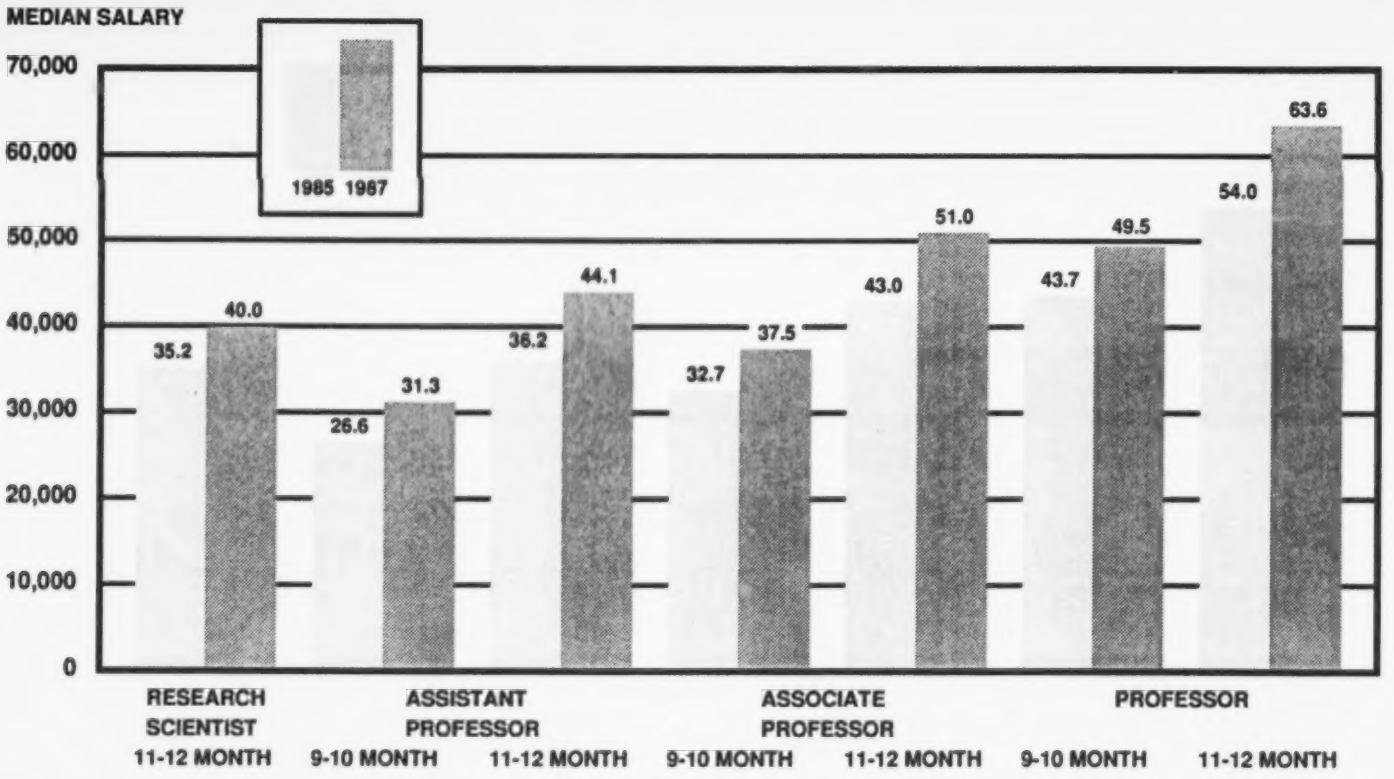

Figure 12. 1985 and 1987 median salaries by academic rank for PhDs remaining within the same rank.

- Postdocs are the youngest and the lowest paid of all major PhD groups. Therefore, those who move out of these positions into permanent full-time employment stand to gain much financially. Society members who had been employed in a postdoctoral position in 1985 and then moved into nonpostdoctoral university employment by 1987 increased their earnings by over 40%.
- PhDs who changed employers within the university sector typically changed academic rank as well. Consequently, their salary levels increased by over 20% between 1985 and 1987.
- Salary levels differ widely between the university and industrial sectors. By taking industrial positions, PhDs who left universities increased their salaries by over 50%.
- PhDs who moved from one industrial employer to another reported a 16% salary increase over the two-year period between 1985 and 1987. This is somewhat higher than increases reported by their colleagues who stayed with the same industrial employer. However, more mobile society members tend also to be younger, accounting for much of the increase differential.

Table 16. 1985 and 1987 salaries for members continuing to work in the same university by academic rank, PhDs.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age in 1987	Total Number Known
		(in thousands of dollars)				
Full Professor	1985	43.7	46.2	12.3		
9–10 month salary	1987	49.5	52.3	13.6	54	385
Full Professor	1985	54.0	57.4	12.8		
11–12 month salary	1987	63.6	66.4	15.0	54	111
Associate Professor	1985	32.7	33.1	6.0		
9–10 month salary	1987	37.5	38.8	7.9	46	87
Associate Professor	1985	43.0	48.9	18.7		
11–12 month salary	1987	51.0	56.4	23.0	45	34
Assistant Professor	1985	26.6	27.2	3.6		
9–10 month salary	1987	31.3	32.2	5.3	35	50
Assistant Professor	1985	36.2	37.2	9.0		
11–12 month salary	1987	44.1	44.5	10.8	36	25
Research Staff (11–12 month salary)	1985	35.2	37.3	11.5		
(not Postdoctorates)	1987	40.0	42.9	12.8	43	36

Table 17. 1985 and 1987 salaries for members who changed employers during the two years, PhDs.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age in 1987	Total Number Known
		(in thousands of dollars)				
University (Postdoctorates)	1985	21.0	20.7	4.3		
University[a]	1987	30.0	32.5	10.2	33	23
University (not Postdoctorates)	1985	43.5	43.9	16.0		
University	1987	52.5	55.4	17.1	42	35
University	1985	30.9	34.9	15.8		
Industry	1987	50.0	49.2	11.0	39	23
Industry	1985	51.8	53.2	15.7		
Industry	1987	60.0	60.6	14.1	41	72
Government & FFR&DC	1985	47.6	51.0	19.2		
Industry	1987	57.8	66.6	26.4	42	14

[a] 4 of these PhDs were still postdocs in 1987.

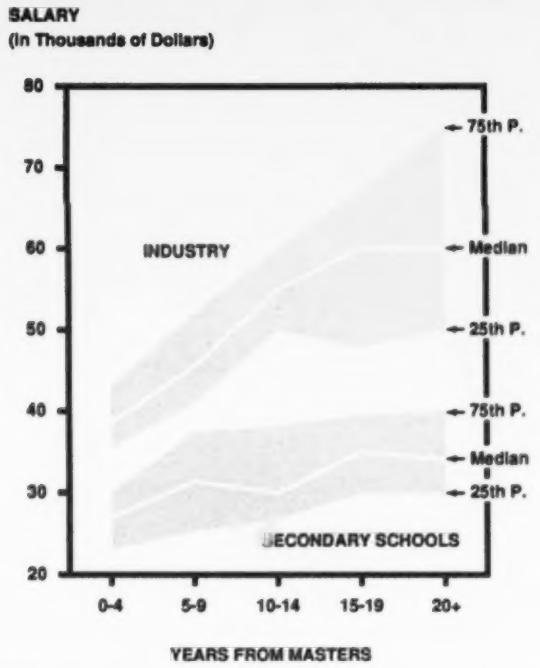

Figure 13. Salary structure in industry and secondary schools by years from Masters degree, 1987.

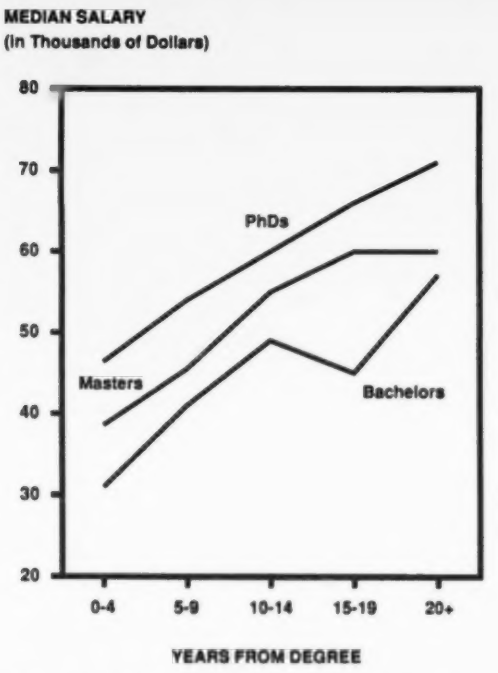

Figure 14. Median salaries in industry by degree level and years from degree, 1987.

SALARIES FOR MASTERS AND BACHELORS

- Most lower degree holders among society members are advanced graduate students who are not included in typical salary analyses. Though they do not represent a high proportion of the total membership, there are a substantial number of non-student masters and, to a lesser extent, bachelors degree holders who are employed in industry, secondary schools, and government.
- Society members who hold masters degrees are chiefly employed by industry (40%) or secondary schools (20%). Nearly three-quarters of the society members who work in secondary schools hold masters degrees.
- The only employment sector where comparisons between degree levels can be examined is industry. At all levels of professional experience, industrially employed PhDs receive larger salaries than their colleagues with lower degrees. In general, doctorates receive salaries $5,000 to $10,000 higher than society members holding masters degrees.
- Among sectors that employ a large number of masters, high schools and two-year colleges pay the least, with median salaries in the low-to mid-thirties. By contrast, industry, government and hospitals pay their masters a median of $46,900 and better.
- As a group, masters degree holders working in hospitals have been in the labor market 4–10 years less than those in other employment sectors. This makes their median annual salary of $46,900 all the more impressive. Most are involved in patient care or other kinds of clinical work.
- The disparity in median salaries observed between industry and secondary schools is large. At the lowest levels of experience, industrially employed masters earn $11,000 more annually than their peers in high schools. For those who have been in the labor market for many years, the difference is even more striking, with median industrial salaries of nearly $26,000 more per year than those in secondary schools.

Table 18. 1987 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	35.0	34.6	6.9	48	56
Secondary School Teachers	32.0	33.2	7.9	45	151
Industry/Self-Employed	52.7	56.0	21.3	42	303
Government	45.6	47.6	13.0	46	79
FFR&DC	50.0	48.0	13.2	46	38
Hospital	46.5	46.9	12.5	38	52

Table 19. 1987 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)					
Secondary School (Teachers only)	0–4	*	*	*	*	*	*	13
	5–9	25.4	31.4	37.5	31.4	8.6	40	23
	10–14	26.8	30.0	38.2	31.3	8.2	44	26
	15–19	30.0	35.0	39.5	34.7	7.6	45	47
	20 +	30.0	34.1	40.0	35.7	6.8	54	41
Industry/Self-Employed	0–4	35.5	38.6	43.0	40.9	11.4	30	51
	5–9	41.0	45.5	52.0	47.6	10.9	34	57
	10–14	50.0	55.0	60.0	56.0	14.8	37	40
	15–19	47.9	60.0	67.0	59.5	17.0	44	34
	20 +	50.0	60.0	75.0	65.5	26.0	55	117

**Number of respondents too small to calculate reliable statistics.*

Table 20. 1987 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	31.0	31.8	6.4	28	36
5–9	41.0	42.1	9.6	31	39
10–14	49.0	50.3	14.1	35	32
15–19	45.0	52.1	25.1	40	29
20 +	57.1	64.6	36.8	56	86

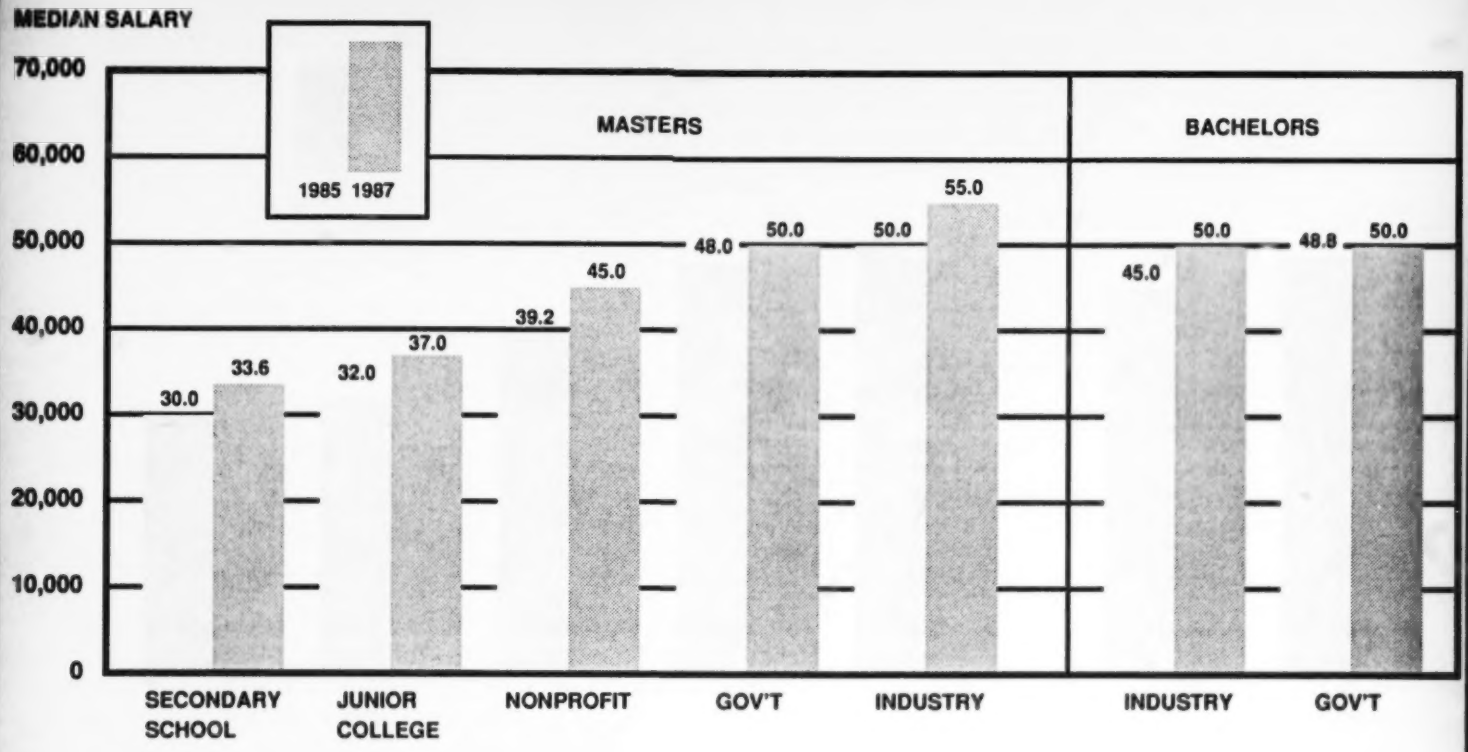

Figure 15. 1985 and 1987 median salaries by employment sector for Masters and Bachelors remaining with the same employer.

- Median ages at each level of experience are higher in secondary schools than in industry. This indicates that many bachelors degree recipients working in secondary schools may have earned their masters degrees after having been out in the workforce.

- Industry and government are the two largest employers of society members with a bachelors degree. In these settings, members are typically involved in either design/engineering, applied research, or administration.

Table 21. 1985 and 1987 salaries for members continuing with the same employer in selected employment sectors, Masters and Bachelors.

	Year	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age in 1987	Total Number Known
Masters						
Secondary School	1985	30.0	30.3	6.2		
(Teachers only)	1987	33.6	34.6	7.6	47	91
Junior College	1985	32.0	32.5	5.5		
	1987	37.0	36.3	6.5	51	38
Industry	1985	50.0	53.5	27.7		
	1987	55.0	57.6	22.4	45	164
Government	1985	48.0	48.5	10.5		
	1987	50.0	52.1	11.5	50	49
Hospital & Nonprofit	1985	39.2	40.6	10.7		
	1987	45.0	46.7	12.8	39	33
Bachelors						
Industry	1985	45.0	46.4	17.7		
	1987	50.0	55.6	29.4	47	105
Government	1985	48.8	47.4	14.3		
	1987	50.0	50.4	14.9	53	22

- Changes in median salary for bachelors and masters who stayed with the same employer from March 1985 to March 1987 vary according to employer type. The largest percentage salary increases, of approximately 15%, were observed in two-year colleges and in the hospital/nonprofit sector.

- By contrast, masters and bachelors who remained with the same government employer did not fare as well. Due to federal budget reduction efforts, this group received increases of as little as 2% per year between 1985 and 1987.

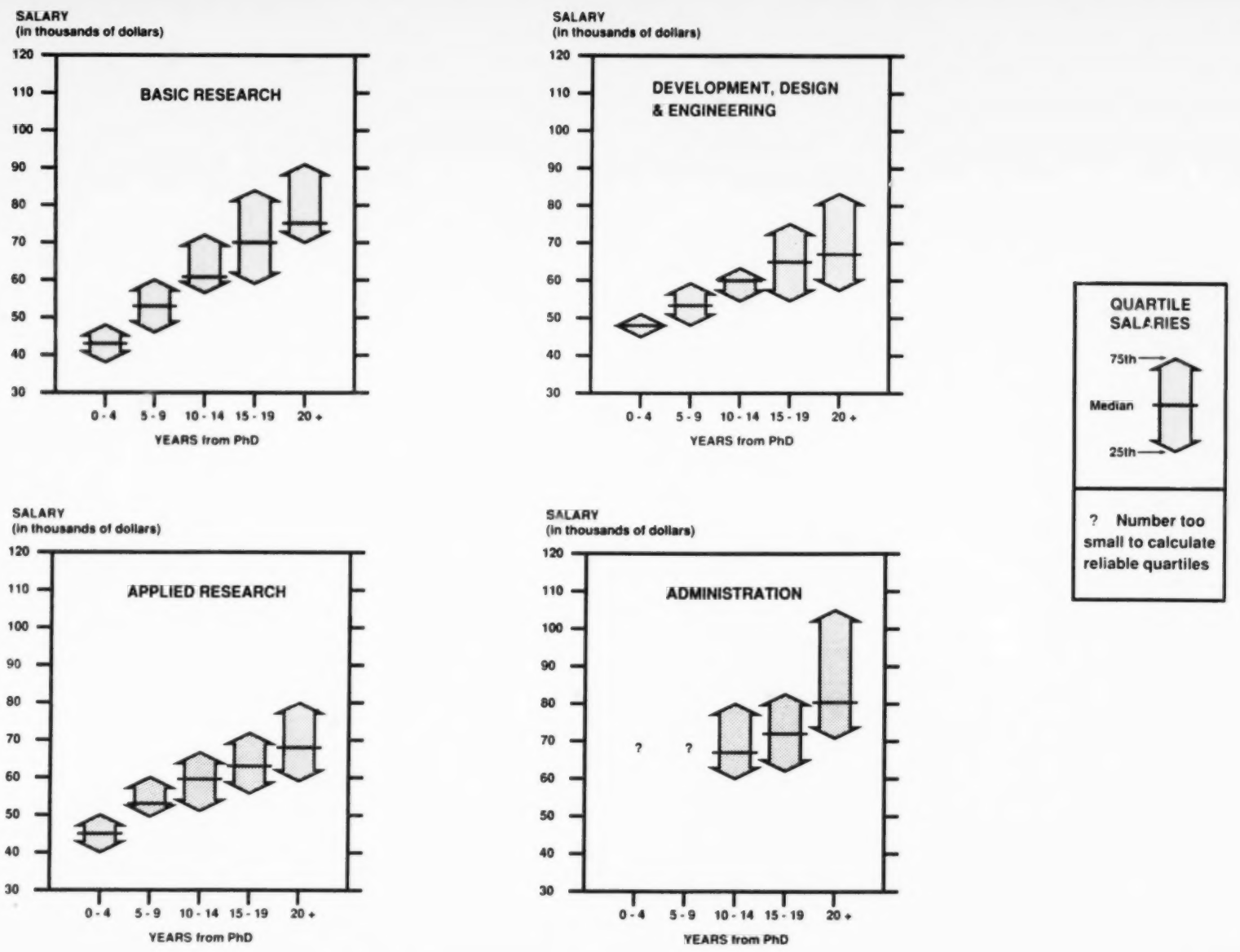

Figure 16. Industrial salaries by principal work activity and years from PhD, 1987.

Table 22. 1987 industrial salaries by principal work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)					
Basic Research							
0–4	38.0	43.0	48.0	43.9	13.9	31	36
5–9	46.0	53.0	60.0	52.8	8.3	34	30
10–14	56.5	60.8	72.0	64.8	11.4	40	16
15–19	59.0	70.0	84.0	71.2	17.6	44	22
20 +	70.0	75.2	91.0	80.6	18.1	53	33
Applied Research							
0–4	40.0	45.0	50.0	45.3	6.7	32	76
5–9	49.5	53.0	60.0	54.2	7.6	35	105
10–14	51.0	59.5	66.6	60.2	12.9	41	73
15–19	55.7	63.0	71.8	65.7	16.2	46	62
20 +	59.0	68.0	80.0	71.0	17.5	56	77
Development, Design and Engineering							
0–4	44.9	48.0	51.0	47.0	8.9	32	42
5–9	48.0	53.3	59.2	53.9	10.3	36	53
10–14	54.4	59.9	63.2	59.1	9.6	41	51
15–19	54.5	64.9	75.1	65.4	14.1	46	43
20 +	57.3	67.0	83.2	72.3	27.3	55	68
Administration							
0–4	•	•	•	•	•	•	2
5–9	•	•	•	•	•	•	11
10–14	60.0	67.0	80.0	71.7	21.4	40	23
15–19	62.0	72.0	82.6	75.4	19.5	46	34
20 +	70.8	80.4	105.0	90.3	29.0	55	57

**Number of respondents too small to calculate reliable statistics.*

SALARIES AND PRIMARY WORK ACTIVITY

• Median starting salaries in industry are relatively consistent across work activities. From one work activity to the next, salaries paid to industrially employed PhDs with less than five years of experience were in the $43–48,000 range

• PhDs engaged in non-administrative activities earn comparable salaries throughout most of their careers. However, one small cohort of professionals, those who have been in the labor force for 15 or more years and who are doing basic research, appear to be earning somewhat more than their colleagues doing more applied endeavors. In general, these scientists are employed by industrial firms which maintain large research facilities, such as AT&T and IBM.

• Individuals in industry typically move into administration later in their careers; 45% of all PhDs who are primarily engaged in administration have 20 and more years of experience. Those who shift into administration earn substantially more than their colleagues outside of administration, although their salary levels appear to have flattened in recent years.

Table 23. 1985 and 1987 salaries for members continuing in the same principal work activity, PhDs.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age in 1987	Total Number Known
		(in thousands of dollars)				
Teaching	1985	36.3	38.1	11.8		
	1987	41.3	43.9	13.8	50	600
Basic Research	1985	44.2	45.3	15.6		
	1987	51.0	52.2	16.2	44	770
Applied Research	1985	49.9	51.4	13.6		
	1987	56.4	58.3	14.5	43	544
Development	1985	50.1	52.9	16.0		
	1987	58.0	60.6	17.3	45	127
Design/Engineering	1985	50.5	52.7	14.2		
	1987	58.4	60.5	17.0	44	73
Administration	1985	61.5	64.9	22.3		
	1987	68.5	70.8	22.9	51	249

- Between 1985 and 1987, salary increases for society members across all work activities remained comfortably ahead of inflation, 6–8% annually.

- Among masters degree recipients, the largest percentage salary increases were earned by those engaged in teaching, the smallest by those in administration. It is worth noting, however, that administrators still continue to earn considerably more than their non-administrative peers.

- Society members with bachelors degrees earned annual salary increases in the 6–10% range between 1985 and 1987. Caution should be taken when interpreting salary data for lower degree holders. The relatively small number of nonstudent masters and bachelors who belong to AIP Member Societies may not be representative of all lower degree holders with physics or related science and engineering backgrounds.

Table 24. 1985 and 1987 salaries for members continuing in the same principal work activity, Masters.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age in 1987	Total Number Known
		(in thousands of dollars)				
Teaching	1985	30.1	30.5	6.5		
	1987	35.0	34.8	7.6	48	160
Applied Research	1985	48.0	47.5	13.7		
	1987	52.0	53.2	15.3	47	66
Development	1985	47.0	49.2	13.5		
	1987	52.7	53.9	13.0	49	52
Design/Engineering	1985	44.0	47.0	13.6		
	1987	50.6	53.6	15.8	41	50
Administration	1985	51.0	59.6	40.5		
	1987	55.0	62.7	30.5	50	53

Table 25. 1985 and 1987 salaries for members continuing in the same principal work activity, Bachelors.

	Year	Median Salary	Mean Salary	Standard Deviation	Median Age in 1987	Total Number Known
		(in thousands of dollars)				
Teaching	1985	21.9	22.8	5.1		
	1987	26.3	27.4	5.4	40	21
Applied Research	1985	44.5	45.8	13.0		
	1987	50.0	51.6	14.3	45	30
Development	1985	42.0	44.9	14.3		
	1987	48.5	52.9	23.2	46	24
Design/Engineering	1985	41.1	43.6	11.8		
	1987	46.7	49.1	13.5	42	43
Administration	1985	58.0	63.6	25.6		
	1987	68.2	74.7	41.5	53	27

Table 26. 1987 industrial salaries by sex and years from degree.

Years from Degree	Median Salary (in thousands of dollars)	Standard Deviation (in thousands of dollars)	Median Age	Total Number Known
0–4				
Male	43.0	10.6	31	216
Female	40.0	9.7	30	35
5–9				
Male	51.5	14.7	35	275
Female	48.2	9.9	34	32
10 +				
Male	62.5	24.7	48	959
Female	55.0	19.8	41	24

Table 27. 1985 and 1987 salaries by sex and major employment sector.

	Year		Median Salary (in thousands of dollars)	Mean Salary (in thousands of dollars)	Standard Deviation (in thousands of dollars)	Median Age in 1987	Total Number Known
Academic	1985	Male	37.5	40.5	14.8		
		Female	30.0	32.7	12.1		
	1987	Male	43.0	46.9	16.8	48	1397
		Female	37.9	39.1	14.7	46	92
Nonacademic	1985	Male	50.3	53.5	18.5		
		Female	44.2	45.0	13.3		
	1987	Male	57.2	60.0	19.5	45	1753
		Female	50.0	50.8	14.2	38	97

PhD SALARIES FOR MALES AND FEMALES

• In general, men with PhDs earn higher salaries than their female counterparts. In many cases men have been out in the physics workforce longer and therefore command larger salaries. Age alone, though, does not account for the disparity completely.

• In industry, salary differences between men and women range from 7 to14%, depending on level of experience. The largest gap between men and women exists at the highest level of experience. Not only are women at this level of experience younger than men by seven years, but they are also less likely to hold top-paying administrative positions.

• In academe, women's salaries lagged behind men's by 25% in 1985. By 1987 this figure had dropped to 13% due to the proportionally larger salary increases earned by women. During this period women's salaries jumped by over one-quarter, while men's increased by a little over one-seventh.

AMERICAN GEOPHYSICAL UNION SALARIES

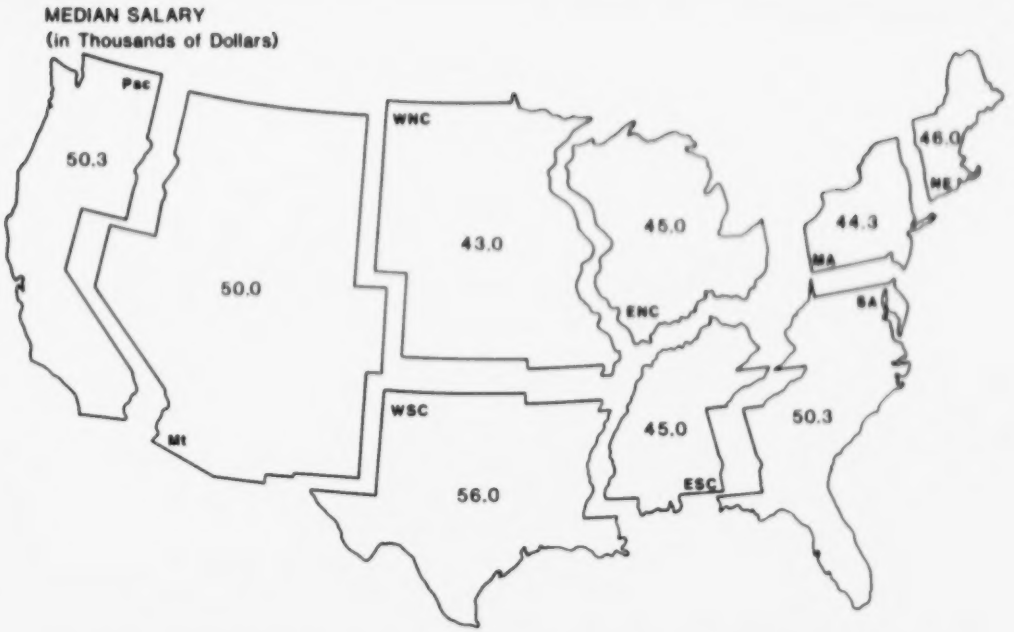

Figure 17. Variation in median salary for PhDs by geographic division, 1987 AGU.

In 1986, the American Geophysical Union (AGU) became an AIP Member Society. With a membership of approximately 20,000, the AGU is now the second largest Member Society. This section examines how the salaries paid to AGU members vary by geographic location, employment sector and degree level.

Salaries and Geographic Location for PhDs, AGU

- AGU members are concentrated in different parts of the country than members of the other Member Societies. For example, approximately one out of every two AGU members lives in one of the sunbelt states, that is, in the states comprising the West South Central, the Mountain and the Pacific regions. Only one in three members of the other nine Member Societies reside in the sunbelt. In the industrial Northeast the concentrations are reversed; the Midatlantic is home to 10% of all AGU members, and 20% of all other members.

- The largest number of AGU members with a PhD reside along the Pacific coast, especially in California. Members are also clustered in and around the nation's capital; Maryland, Virginia, and the District of Columbia account for roughly 15% of all AGU doctorates. Other large pockets of members are found in Massachusetts, New York, Colorado, and Texas.

- The overall median salary among AGU members with a PhD was $50,000 in 1987. Salary levels vary, however, from one area of the country to the next. In places dominated by industry, median salaries are high. A large concentration of academically employed members, on the other hand, usually translates into lower pay rates and suppressed overall salaries.

- AGU members residing in the West South Central command the highest salaries in the nation, roughly $56,000 annually. This is due mainly to petroleum-related positions in Texas. Although the fossil-fuel industry has experienced severe cut backs in recent years, those still employed in it enjoy well paying positions.

Table 28. 1987 AGU salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
New England	46.0	47.2	15.4	41	81
Middle Atlantic	44.3	47.1	17.6	41	87
South Atlantic	50.3	52.6	17.3	45	168
East North Central	45.0	46.3	14.8	45	55
East South Central	45.0	49.3	17.5	40	25
West North Central	43.0	45.4	15.0	46	23
West South Central	56.0	55.3	16.1	43	68
Mountain	50.0	49.5	14.3	44	107
Pacific	50.3	52.7	19.7	43	213
Canada[b]	53.0	53.7	19.7	43	53

[a] See Appendix A for state composition of each division.
[b] Canadian salaries are reported in U.S. dollars. One dollar U.S. = 1.33 dollars Canadian.

Table 29. 1987 AGU salaries and employment sector distribution for selected states, PhDs.[a]

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known	Academic %	Nonacademic %
	(in thousands of dollars)						
California	54.0	55.9	20.6	44	156	40	60
Northern	53.0	53.6	14.6	44	76	28	72
Southern	55.0	58.1	24.8	43	80	50	50
Colorado	50.0	51.0	16.5	47	49	30	70
DC	55.6	57.4	15.1	49	35	5	95
Maryland	47.0	52.0	20.2	44	63	16	84
Massachusetts	46.8	48.0	15.1	41	51	38	62
New Mexico	51.0	51.7	10.2	39	27	17	83
New York	40.6	45.9	19.6	41	51	63	37
Northern	41.2	43.8	16.9	40	25	81	19
Southern	39.5	48.0	22.0	41	26	47	53
Texas	57.0	56.7	16.8	41	49	36	64
Virginia	53.9	55.0	16.9	45	31	19	81
Washington	41.0	41.6	6.9	42	27	52	48

[a] Several states were not included above because the number of respondents was too small to calculate reliable statistics.

• After Texas, members residing in Washington, D.C. report the highest overall median salary nation-wide, $55,600. In general, these PhDs are employed by the federal government and are involved in either basic research, applied research, or general science administration. As evidenced by their overall median age of 49, they have been in the labor force longer than their colleagues in other locations and therefore earn higher salaries.

• PhDs in the West North Central earned roughly $43,000 in 1987, $7,000 below the national average. Like their peers in the other nine AIP Member Societies, AGU members who live and work in this location are primarily employed by large state universities and small private colleges. Over 80% of all positions in this area are academic. It comes as no surprise then that the median West North Central salary falls below the national norm.

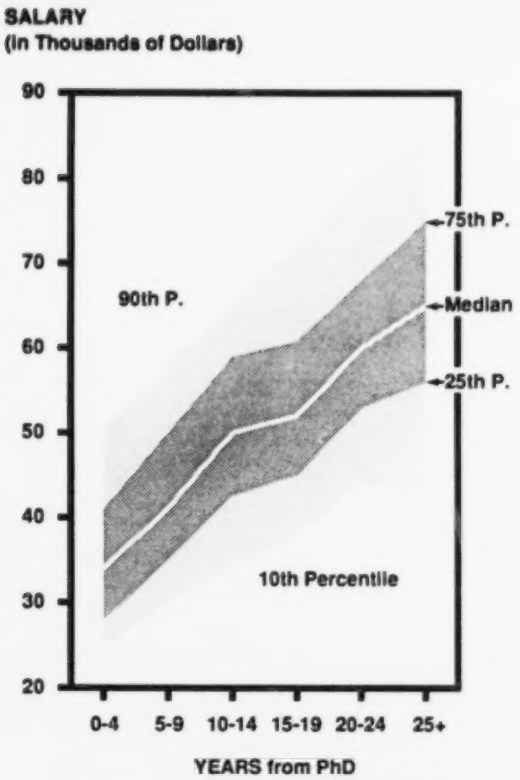

Figure 18. Median salaries for PhDs by years from degree, 1987 AGU.

Table 30. 1987 AGU salaries by major employment sector, PhDs.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
University					
9–10 Month Salary	42.1	46.0	14.9	46	174
11–12 Month Salary	47.0	49.6	20.9	44	165
Industry/Self-Employed	56.7	57.8	19.8	41	140
Government	53.0	52.5	12.5	47	176
FFR&DC	52.7	55.6	12.5	40	68
Nonprofit	45.0	47.0	16.7	38	49

Table 31. 1987 AGU salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–4	34.0	35.4	9.4	33	155
5–9	41.1	43.6	12.1	36	149
10–14	50.0	50.3	12.4	42	151
15–19	52.0	53.7	13.1	46	140
20–24	60.0	62.0	16.3	51	118
25–29	65.0	63.8	14.2	56	54
30 +	68.0	68.8	25.7	63	55

Salaries and Employment Sector for PhDs, AGU

- Universities, industry, and government represent the three largest employers of AGU members with doctorates. Universities account for nearly half of all PhD employment, while government and industry represent approximately one-fifth each. Employment in national laboratories and nonprofit organizations is less prevalent, while few if any members work in secondary schools, two-year colleges, or hospitals.
- In comparison to the members of the other nine AIP Member Societies, AGU members with PhDs are twice as likely to be employed by federal, state, or local government. Employment in industry, on the other hand, is somewhat less common than among those in the other Member Societies.
- Although the overall median salary for PhDs in AGU reached $50,000 in 1987, there was considerable variation among employment sectors. Those employed by industry, the national laboratories, or government usually earn more than their peers with the same amount of experience who are employed by an academic institution or a non-profit organization. This is consistent with the pay structure found among members of the other nine Member Societies.

Table 32. 1987 AGU industrial salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	34.4	40.9	46.3	40.9	8.1	34	26
5–9	49.1	54.0	60.0	55.4	15.1	36	34
10–14	51.0	57.1	64.5	58.4	12.4	42	30
15–19	46.5	62.5	70.0	61.8	14.4	45	20
20–24	*	*	*	*	*	*	15
25 +	*	*	*	*	*	*	13

*Number of respondents was too small to calculate reliable statistics.

Table 33. 1987 AGU government salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	33.0	35.8	41.3	38.2	7.5	35	22
5–9	40.0	42.0	48.0	44.3	8.1	39	26
10–14	43.9	50.3	59.0	51.1	8.6	43	32
15–19	50.0	54.0	60.0	55.9	8.9	46	36
20–24	55.0	58.0	64.5	60.8	7.9	50	26
25 +	64.6	68.0	70.0	64.0	9.7	58	30

• In 1987 typical starting salaries ranged from a high of $40,900 in industry, to a low of $29,400 in universities on a 9–10 month salary base.

• One strong factor in determining salary is years of experience. Typical PhD salaries among AGU members begin at $34,000 for those with less than five years of experience and climb steadily to a high of $68,000, earned by those with thirty or more years in the labor force.

• AGU members with PhDs are younger than the members of the other nine Member Societies. In 1987 the overall median age of PhDs in AGU was 41, in comparison to a median of 45 among the other societies. Consequently, in each of the five major employment sectors, AGU overall median salaries are slightly lower. From one sector of the economy to the next, salary differences ranged from $1,000 to $5,000 per year. For example, the overall median salary of AGU members employed in a non-profit organization was $45,000 in 1987, nearly $5,000 less than the overall median salary earned by members of the other Member Societies who were employed by a non-profit. However, in this sector of the economy, AGU members were on average six years younger.

• Nearly 22% of all AGU members with a doctorate are employed by the government, making this the second largest employer of PhDs, right behind universities. The United States Geological Survey, the National Aeronautics and Space Administration, and the United States Department of the Navy are among the largest federal agencies employing AGU PhDs.

• In 1987 the overall median salary for PhDs employed by the government was $53,000. This is $3,000 above the average and second only to industry. In general, government employees are older than their peers outside of government and are involved in either research or administration. Like many of their fellow AGU members, they describe their work under the broad categories of either Earth Science, Atmospheric Science, Solid Earth Geophysics, or Ocean Science.

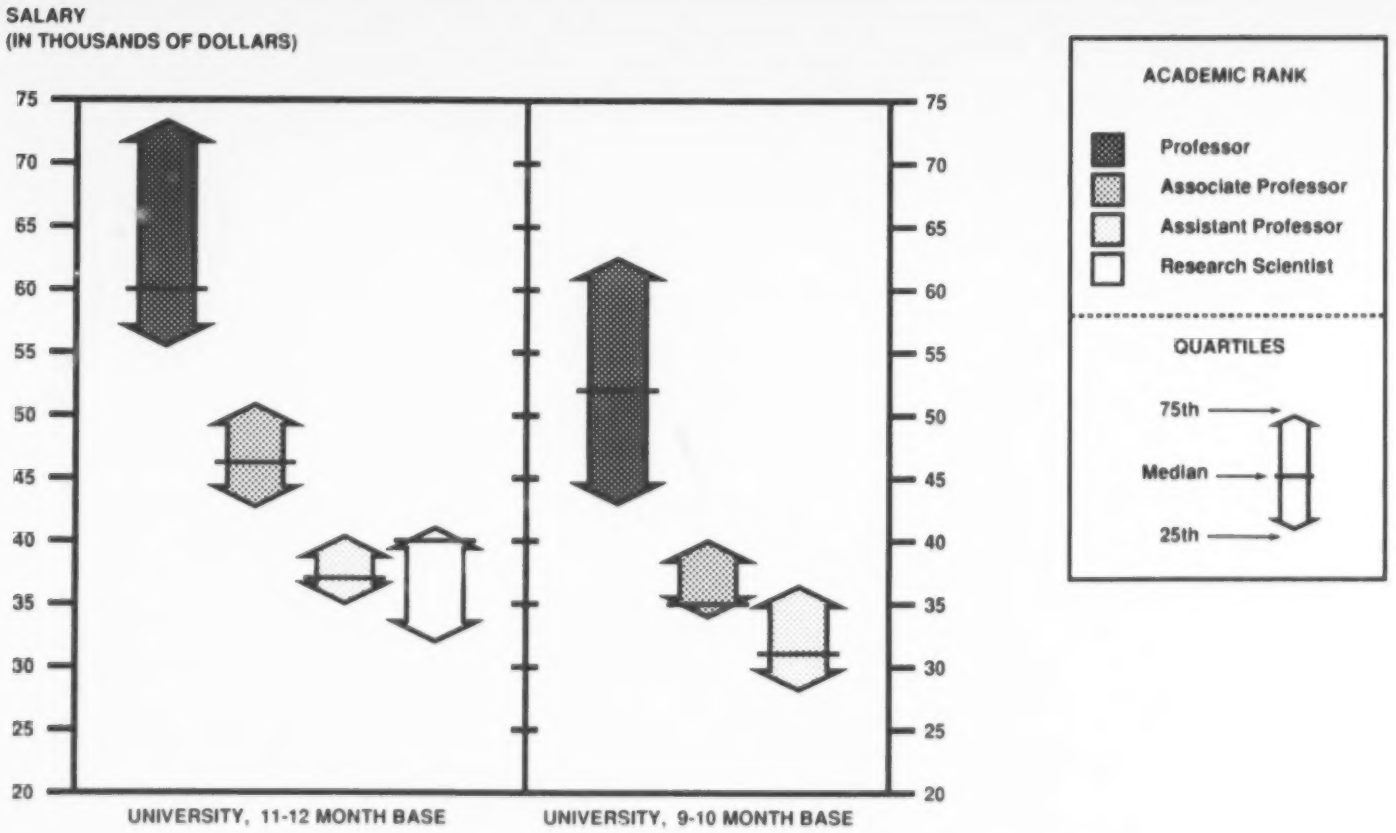

Figure 19. University salaries for PhDs by academic rank, 1987 AGU.

• Approximately 45% of AGU's PhDs are employed by universities. The overall median salary for the university employed in 1987 ranged from $42,100 for those on a 9–10 month salary base to $47,000 for those on an 11–12 month salary base. Like their colleagues in the other nine AIP Member Societies, the AGU university-employed PhDs are doing either basic research or teaching.

• PhDs in AGU were employed by 15 different national laboratories nation-wide in 1987. Over half worked at one of four installations: Jet Propulsion Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, or Sandia National Laboratory. In comparison to their colleagues in government, PhDs in the national labs are seven years younger and earn a median salary of $52,700, only $300 less than government employees. Basic and applied research are the dominant themes here; over 80% of all PhDs in a national laboratory are involved in one kind of research or another.

Table 34. 1987 AGU university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	*	*	*	*	*	*	14
5–9	31.0	37.0	41.0	36.8	6.3	36	28
10–14	40.0	49.0	55.0	48.9	11.5	42	24
15–19	45.2	51.0	56.0	52.2	10.6	46	38
20–24	56.4	60.0	66.0	61.7	14.0	51	25
25 +	*	*	*	*	*	*	19

[a] In addition, there are 14 postdocs in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary is $24,000.
**Number of respondents was too small to calculate reliable statistics.*

Table 35. 1987 AGU university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	26.0	29.4	33.1	30.7	5.0	33	27
5–9	32.0	36.0	40.0	36.6	6.4	37	19
10–14	34.8	39.6	47.5	41.3	9.0	42	29
15–19	35.3	40.7	50.0	44.7	11.7	46	28
20–24	47.4	52.0	61.4	53.4	10.0	51	36
25 +	46.3	62.0	72.0	61.3	16.2	61	33

[a] Postdocs excluded.

Table 36. 1987 AGU university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Professor							
9–10 Month Salary	43.0	52.0	62.5	54.0	13.5	52	101
11–12 Month Salary	55.5	60.0	73.3	65.5	22.5	50	65
Associate Professor							
9–10 Month Salary	34.0	35.0	40.0	37.7	7.2	41	33
11–12 Month Salary	42.7	46.2	50.8	46.3	5.5	44	24
Assistant Professor							
9–10 Month Salary	28.2	31.1	36.4	32.3	5.3	34	35
11–12 Month Salary	35.0	37.0	40.3	37.7	5.4	34	22
Research Associate (11–12 Month Salary)							
Postdoctorates	*	*	*	*	*	*	*
Other Research Staff	32.0	40.0	41.0	40.1	11.8	42	24

**Number of respondents was too small to calculate reliable statistics.*

Table 37. 1987 AGU salaries by major employment sector, Masters and Bachelors.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
Masters					
Industry/Self-Employed	41.4	48.7	35.1	35	97
Government	38.0	39.4	12.7	38	95
FFR&DC	44.0	46.6	17.9	40	20
Bachelors					
Industry/Self-Employed	38.9	44.6	25.2	38	39

Salaries and Employment Sector for Masters and Bachelors, AGU

• Approximately two out of every five AGU members hold either a masters or a bachelors degree. Many of the masters degree holders, nearly one-third, are pursuing doctorates, while close to half of all bachelor's degree recipients are in graduate school.

• Unlike many of the disciplines represented under the AIP umbrella, a doctorate does not appear to be a sine qua non for employment among AGU members. Most AGU members holding a masters degree are employed either in industry (40%) or government (36%). They earn an overall median salary of $39,000, which is $11,000 lower than PhDs. The highest paid masters positions are in industry and the national labs, where median salaries in 1987 were $48,700 and $46,600, respectively. The typical government worker earned at least $7,200 less than that annually.

• In the other nine AIP Member Societies, many of the masters are older members who received their training years ago. By contrast, full-time employed AGU members who hold masters degrees are relatively young; median ages range from 35 in industry to 40 in the national labs.

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Some separate but limited information on Canadian residents is also provided. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

Medians:

M_1, that point below which p_1^{th} values fall,
M_2, that point below which p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$p = 0.5$,
n = sample size,
z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, *where*
$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed.
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Standardization

In one analytic section of this report standardization techniques were used to control on related variables that effect salary levels. To examine directly the impact of regional variation on salaries, variation in employer type was controlled. Employer-adjusted average salaries for each region were calculated by applying the nationwide employer distribution to the employer-specific mean salaries within each region.

Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the All-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.